



# Special Track: **Beyond Deep Learning: Exploring the Potential of Neurally-inspired Neural Networks for Intelligent Systems**

**18<sup>th</sup> International Symposium on Visual Computing**

Lake Tahoe, NV, USA

October 16-18, 2023

<https://www.isvc.net/>

## **Scope**

In recent years, deep learning has achieved remarkable success in various applications, especially in the field of computer vision. However, it is not a secret that deep learning models are limited by their dependence on large amounts of labeled data and their susceptibility to adversarial attacks. Moreover, deep learning models are not robust to out-of-distribution data, which hinders their real-world applicability. Lastly, deep learning models lack the flexibility and adaptability of biological neural networks, which have evolved over millions of years to be highly efficient and robust. To address these limitations, there is a growing interest in neurally-inspired neural networks as a means of overcoming the limitations of deep learning and enabling the development of more intelligent systems.

The objectives of this year's special track are twofold. First, we invite contributions that show the potential of neurally-inspired networks to overcome the limitations of traditional deep learning approaches. By more closely mimicking the functionality of biological neural networks, these networks have the potential to learn from unsupervised data, be more robust to adversarial attacks, and better handle out-of-distribution data. Furthermore, they may enable the development of more efficient and explainable AI systems.

Second, we will invite the latest advances in neuromorphic computing algorithms, hardware, and software that enable the development of neurally-inspired networks and their applications in

computer vision. Of particular interest are new discoveries, challenges and opportunities associated with these new computing paradigms that more closely mimic the functionality of biological neural networks and their implications for the design of intelligent systems. Submissions that highlight the latest applications of these networks in computer vision such as super-resolution, image classification, and object recognition are encouraged.

Overall, this special track aims to bring together researchers from different disciplines to explore the potential of neurally-inspired neural networks for intelligent systems. By doing so, we hope to facilitate the development of more robust, efficient, and interpretable AI systems that can operate in real-world environments.

## Topics

Topics of interest include but are not limited to:

- Neuromorphic Computing
- Spiking Neural Networks
- Event-based systems
- Self-supervised Learning
- Semi-supervised Learning
- Few-shot Learning
- Energy-based models
- Robust Classification/Object detection/ Object segmentation
- Generative Machine Learning
- Neuro-inspired AI
- Biologically Plausible AI
- Sparse Coding
- Sparse Distributed Representations
- Energy Efficient Machine Learning
- Top Down Feedback in Machine Learning
- Inhibitory and Excitatory Lateral/Feedback connections
- Cognitive Neural Architectures
- Non-von Neumann computing architectures and models

## Organizers

**Edward Kim**, Drexel University, USA

**Garrett T. Kenyon**, Los Alamos National Laboratory, USA

**Michael Teti**, Los Alamos National Laboratory, USA

**Yijing Watkins**, Pacific Northwest National Laboratory, USA

## Important Dates

Same as ISVC deadlines, see <http://www.isvc.net/>

## **Paper Submission Instructions**

Same as ISVC paper submission instructions, see <http://www.isvc.net/index.php/paper-submission/>